A YANG Model for Network and VPN Service Performance Monitoring

draft-www-opsawg-yang-vpn-service-pm-01

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Background

• Initially discussed in BESS WG
  – This document defines a YANG model for both Network Performance Monitoring and VPN Service Performance Monitoring
    • monitor and manage network performance on the basic network topology (RFC 8345)
    • the service topology between VPN sites
  – Align with VPN Common YANG model
    • Uses import references to VPN Common YANG model
  – Fill the gap identified in the L2VPN/L3VPN Service Delivery use case defined in draft-ietf-opsawg-model-automation-framework-04
    • Provide L3NM/L2NM capability and notification to upper layer.

• Assumptions
  – This draft does not introduce new metrics for network performance or mechanisms for measuring network performance.
  – This draft exposes network and service layer performance information to consumers of the model (RFC 8345) based on existing measurement protocol
    • IP traffic performance measurement protocol such as OWAMP, TWAMP
    • IP traffic performance metric such as one way delay, roundtrip delay, loss, PDV
    • MPLS traffic performance measurement such as MPLS loss and delay measurement for MPLS[RFC6374], MPLS-TP loss and delay measurement[RFC6375]
    • Ethernet traffic performance measurement such as Y.1731
Fill the gap identified from L2VPN/L3VPN Service Delivery

Figure 6: L3VPN Service Delivery Example (Target)

Source: draft-ietf-opsawg-model-automation-framework-04
Use Case: Real Time VPN Service Monitoring

Network Performance data source: Network device, management system
Performance measurement method: IPPM method, MPLS Loss and Delay Measurement
End to end Network performance calculation method: using PCEP solution [RFC8233] [RFC7471] [RFC7810] [RFC8571]

The goal: Report end to end network performance or service level VPN network performance
• One way delay between PE A in site A and PE F in Site B
• Packet loss between CE1 and PE A in site A
• WAN link bandwidth between CE2 and PE F within Site B
Relationship between VPN service topology and underlay topology

- **Mapping between Overlay and Underlay:**
  - The Site-1, A, B, C are mapped to node (1), (2), (3)
  - while Site-2 A, B are mapped to node (5), (6) in the underlying physical network.

- **VPN-svc 1:** supporting hub-spoke communication for Customer 1 with connecting the customer’s access at 3 sites.

- **VPN-svc 2:** supporting any-any communication for Customer 2 with connecting the customer’s access at 2 sites.

- Establish the relationship between underlay topology and VPN service topology
Model Design Overview

- Augment Basic Network Topo model
  - with service topology parameters and vpn summary statistics info at network level
  - With site role of service topology parameters at node level
  - With performance attribute at link level and termination-point level

- The measurement interval and reference-time associated with these performance data usually depends on configuration parameters in [RFC8641].
Performance Monitoring Data Retrieval

1. Retrieval via YANG Push

```xml
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0"
    message-id="101">
    <establish-subscription
        xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
        <stream-subtree-filter
            xmlns="urn:ietf:params:xml:ns:yang:iets-network-topo">
            <network>
                <network-id>vpn1</network-id>
                <node>
                    <node-id>A</node-id>
                    <node-type xmlns="urn:ietf:params:xml:ns:yang:iets-svc-topo">pe</node-type>
                </node>
                <node>
                    <node-id>B</node-id>
                    <node-type xmlns="urn:ietf:params:xml:ns:yang:iets-svc-topo">pe</node-type>
                </node>
                <link xmlns="urn:ietf:params:xml:ns:yang:iets-network-topology">
                    <link-id>A-B</link-id>
                    <source>
                        <source-node>A</source-node>
                    </source>
                    <destination>
                        <dest-node>B</dest-node>
                    </destination>
                    <svc-telemetry-attributes
                        xmlns="urn:ietf:params:xml:ns:yang:iets-svc-topo">
                        <loss-statistics/>
                        <packet-loss-count/>
                    </svc-telemetry-attributes>
                </link>
            </network>
        </stream-subtree-filter>
    </establish-subscription>
</rpc>
```

2. On-demand Retrieval via RPC polling model

```xml
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0"
    message-id="1">
            <network>
                <network-id>vpn1</network-id>
                <node>
                    <node-id>A</node-id>
                    <node-type xmlns="urn:ietf:params:xml:ns:yang:iets-svc-topo">pe</node-type>
                </node>
                <node>
                    <node-id>B</node-id>
                    <node-type xmlns="urn:ietf:params:xml:ns:yang:iets-svc-topo">pe</node-type>
                </node>
                <link xmlns="urn:ietf:params:xml:ns:yang:iets-network-topology">
                    <link-id>A-B</link-id>
                    <source>
                        <source-node>A</source-node>
                    </source>
                    <destination>
                        <dest-node>B</dest-node>
                    </destination>
                        <loss-statistics/>
                        <packet-loss-count/>
                    </svc-telemetry-attributes>
                </link>
            </network>
        </networks>
    </report>
</rpc>
```

- Use subscription model [RFC8641] to subscribe to their interested network performance data in the data source.

- Use RPC model to fetch network performance data on demand, e.g., the client requests packet-loss-count between PE1 in site 1 and PE2 in site 2 belonging to VPN1.
Way Forward

• Align with VPN Common Module
  – Import service-type, role, link-type, vpn-topology defined in VPN Common YANG
  – Open question:
    • Should P role, PE role, ASBR role be defined in the vpn common YANG?

• Adoption?
  – The authors believe this draft is a good shape for WG adoption